



AEROSPACE STANDARD

AS4984™

REV. B

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Superseding AS4984A

Coating Requirements for Aerospace Hand Tools

RATIONALE

This update of AS4984 is for revision purposes, to clarify language within the standard for coating requirement and testing.

1. SCOPE

This SAE Aerospace Standard (AS) covers requirements for nickel-chromium coatings, black oxide or black phosphate coatings, and alternative coatings for aerospace hand tools.

1.1 Classification

Coatings covered by this document shall be of the following types, as specified:

1.1.1 Type I - Nickel-Chromium Coating

1.1.2 Type II - Black Oxide, Black Phosphate Coating, or Other Black Finish Coatings

1.1.3 Type III - Alternative Coatings

2. APPLICABLE DOCUMENTS

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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2.1 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM A754	Standard Test Method for Coating Weight (Mass) of Metallic Coatings on Steel by X-Ray Fluorescence
ASTM B117	Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM B487	Standard Test Method for Measurement of Metal and Oxide Coating Thickness by Microscopical Examination of Cross Section
ASTM B499	Standard Test Method for Measurement of Coating Thicknesses by the Magnetic Method: Nonmagnetic Coatings on Magnetic Basis Metals
ASTM B530	Standard Test Method for Measurement of Coating Thicknesses by the Magnetic Method: Electrodeposited Nickel Coatings on Magnetic and Nonmagnetic Substrates
ASTM B537	Standard Practice for Rating of Electroplated Panels Subjected to Atmospheric Exposure
ASTM B568	Standard Specification for Decorative Electroplated Coatings of Copper Plus Nickel Plus Chromium on Plastics
ASTM B571	Standard Practice for Qualitative Adhesion Testing of Metallic Coatings
ASTM B748	Standard Test Method for Measurement of Thickness of Metallic Coatings by Measurement of Cross Section with a Scanning Electron Microscope
ASTM D968	Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive

3. REQUIREMENTS

3.1 Requirements for Nickel-Chromium Coating

3.1.1 General

The tool shall be electroplated with a nickel (Ni) followed by chromium (Cr) coating.

3.1.2 Appearance

The coating shall be bright, continuous, and consistent. Visible contact marks resulting from electroplating operations shall be confined to the tool interior. Surfaces of the electroplated tool shall be adherent, smooth, continuous, and free of visible defects, such as blisters, roughness, and uncoated areas which may adversely impact the item's serviceability, durability, safety, and/or appearance. Surfaces shall not be stained or discolored, and shall have a bright appearance. Different plating processes shall be similar in appearance on exterior surfaces relative to chromium coatings. Minor differences in shading are acceptable.

3.1.3 Adhesion

The coating shall be subjected to the adhesion test, as specified in 4.1.2. The plated specimen shall have "perfect" adhesion, as defined in ASTM B571.

3.1.4 Thickness

The minimum coating thickness for chromium and nickel shall be in accordance with the applicable SAE standard. If the standard and/or specification does not state a minimum thickness, the minimum thickness shall be 0.000007 inch (0.000178 mm) for chromium, and 0.000200 inch (0.00508 mm) for nickel.

3.2 Requirements for Type II Black Oxide, Black Phosphate Coating, or Other Black Finish Coatings

3.2.1 General

The tool shall be coated with chemically produced black oxide or black phosphate coating, followed with a rust preventative coating. Other black finish coatings shall conform to requirements as outlined in 3.1.

3.3 Requirements for Type III Alternative Coatings

3.3.1 General

The tool coated with an alternative coating shall meet the appearance, corrosion, adhesion, and abrasion requirements as specified herein. All coatings shall meet the appearance requirements of 3.1.2. Alternative coatings shall be similar in appearance on exterior surfaces to a nickel-chromium plating. Minor differences in shading between the alternative coating and a nickel-chromium plating are acceptable. When like products are furnished in a set or kit consisting of numerous pieces (i.e., the sockets in a socket wrench set), and some are furnished with a nickel-chromium plating and some with an alternative coating, there shall be no appreciable difference in appearance on exterior surfaces between the coatings of the like products having a nickel-chromium plating and those with an alternative coating. Minor differences in shading on interior surfaces, such as the inside of socket wrenches, are acceptable. All qualitative appearance requirements for Type III coatings as specified herein shall be established by the customer and manufacturer and tested in accordance with 4.2.2.

3.3.2 Corrosion

Alternative coatings shall be capable of withstanding 72 hours of exposure to the salt spray test specified in 4.2.5 without falling below a rating of seven, as defined in ASTM B537. A rating of six is considered a failure.

3.3.3 Adhesion

The coating shall be subjected to the adhesion test, as specified in 4.2.4. The plated specimen shall have "perfect" adhesion, as defined in ASTM B571.

3.3.4 Abrasion

The coating/plating shall have no underlying steel exposed anywhere on the test surface, after being subjected to the abrasion test, as specified in 4.2.3.

4. TEST PROCEDURES

4.1 Testing of Type I Nickel-Chromium

4.1.1 Thickness

One measurement of the thickness of nickel and one measurement of the thickness of chromium shall be made in each of the areas indicated on Figures 1 and 2 using any of the following appropriate methods: ASTM A754, ASTM B487, ASTM B499, ASTM B530, ASTM B568, and ASTM B748.

4.1.2 Adhesion

Adhesion shall be tested, as specified in 4.2.4 or ASTM B571, using one of the following methods: grind-saw, push, file, or burnishing.

4.1.3 Test Reports

Test reports shall contain the actual data recorded during the examinations and testing.